

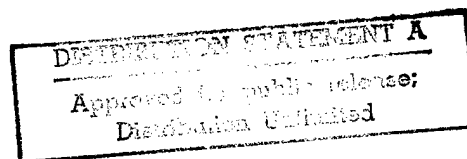
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21 JANUARY 1987

# Japan Report

SCIENCE AND TECHNOLOGY



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21 JANUARY 1987

## JAPAN REPORT

### SCIENCE AND TECHNOLOGY

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## AEROSPACE SCIENCES

### NASA ASKS JAPAN TO LAUNCH U.S. SATELLITE

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 p 5

[Text] The U.S. National Aeronautics and Space Administration (NASA) has recently asked the Japanese Government to launch a U.S. satellite with the H-II rocket now under development by the National Space Development Agency of Japan (NASDA).

The Science and Technology Agency (STA) as well as NASDA will shortly start joint feasibility studies with the U.S. space authority. Japan will basically accept the U.S. request. It is the first time that NASA asked Japan to launch a satellite.

NASA had initially planned to launch the satellite by itself. However, its launch schedules have been very tight since the earlier accident of the "Challenger" Space Shuttle so that it decided to ask for Japan's cooperation.

Japan has been asked by NASA to launch the TRMM remote sensing satellite which is designed to observe tropical rain. The satellite weighing about one or two tons will be placed in a relatively low orbit at an altitude of 300-400 kilometers. Equipped with three sensors, the satellite will observe the sea temperature, the air humidity, and rainfalls over the equator.

Of the three sensors, the microwave radar will be fabricated by the Radio Research Laboratories of the Ministry of Posts and Telecommunications. The observation will be performed jointly by the U.S. and Japan.

The H-II rocket of which development will be completed in 1992 is capable enough to meet the U.S. request. Since Japan has no confirmed launch schedules in 1993-94, STA seems very interested in the U.S. request for the satellite launch.

If it should materialize, it would be Japan's first launch of a foreign satellite. And it would be Japan's first step to industrialize satellite launch services with the H-II rockets.

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CSO: 4307/008

## AEROSPACE SCIENCES

### SJAC SENDS SPACE DEVELOPMENT SURVEY TEAM TO CHINA

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 pp 5-6

[Text]

The Society of Japanese Aerospace Companies (SJAC) sent a survey team on October 22 to China to find out the current status of the Chinese space development activities, including satellite launch programs.

The 13-man team, led by Hiroshi Morikawa (an executive of Mitsubishi Electric Corp.), will visit the Chinese space authorities and facilities in Beijing, Sian and Shanghai. They will return to Tokyo on October 31.

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CSO: 4307/008



## AEROSPACE SCIENCES

### SJAC SURVEYS HELICOPTER COMMUTER MARKET

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 pp 6-7

[Text]

A study group on helicopter commuter business, formed in the Society of Japanese Aerospace Companies (SJAC), has started research on feasibility of the passenger transport business with helicopters in Iwate, Ishikawa and Kyoto Prefectures as model areas.

The research is aimed at seeking the way of industrializing the helicopter commuter services as a means of regional air transport and providing the know-how to commercial helicopter operators.

SJAC performs the research in cooperation with both the private companies and the government including Mitsubishi Heavy Industries, Ltd. (MHI), Kawasaki Heavy Industries (KHI), the Ministry of International Trade and Industry (MITI), the Ministry of Transport (MOT).

SJAC will study distribution of population, movement of people and candidate sites for heliports to work out prospects for demand and operation costs in addition to appropriate types of helicopters for such services.

The study will be joined by MHI, KHI, Ishikawajima-Harima Heavy Industries Co., Ltd., Mitsui & Co., Ltd., Aero Asahi Corp., Japan Development Bank, MITI, MOT, and the National Land Agency.

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## AEROSPACE SCIENCES

MHI FOSTERING MU-300 SALES TO ASDF FOR FC-X

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 pp 7-8

[Text]

Mitsubishi Heavy Industries, Ltd. (MHI) is now promoting the sales of its MU-300-10 (formerly called Diamond II) for the FC-X new flight checker aircraft of the Air Self-Defense Force (ASDF).

Compared with the conventional MU-300, the MU-300-10 is re-engined with the Pratt & Whitney Canada JT15D-5 to uprate the power. It has also improved hot/high performance and its fuel payload has been increased by 200 gallons. With the increased fuel capacity, the aircraft is capable of flying to Marcus Island, the farthest territorial island from the mainland of Japan.

MHI currently produces the MU-300 aircraft at a slow pace in its Nagoya Aircraft Works. However, as Beech Aircraft Corp. will strengthen the sales of the aircraft under the name of the "Beechjet" next year, MHI expects the production pace to go up to about 2.5 aircraft a month.

At present, the MU-300/Beechjet 400 business jets are assembled by MHI at Nagoya Aircraft Works. These aircraft are packaged in containers for shipments to Beech Aircraft Corp. in Wichita, Kansas, for final assembly including installation of the engines and instruments as well as painting.

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CSO: 4307/008

## AEROSPACE SCIENCES

### NEXT JAPAN AIR SHOW POSTPONED UNTIL 1988

Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 pp 3-4

[Text]

The Society of Japanese Aerospace Companies (SJAC) decided on October 27 to postpone the next Japan International Aerospace Show at least a year until 1988.

SJAC had planned to hold the show in 1987 but it failed to reach agreement with the Defense Agency on use of Air Self-Defense Force's Iruma Air Base for the show. Even if the negotiations are settled now, it is too late to hold the show in 1987 considering the period necessary for preparations.

However, since the past air shows held in Japan were often criticized by the foreign participants because of poor prior arrangements, low cost effectiveness, and bad services, it seems quite difficult for Japan to hold an international air show even in 1988 because such an air show must be noticed about 24 months in advance in a practical manner.

In 1988, there are several other international air shows scheduled to be held overseas, including the Asian Aerospace '88 in Singapore, Farnborough International '88 in the U.K., Hannover ILA '88 in West Germany, and Australian Bicentennial Air Show '88 in Australia.

SJAC is also expected to participate in these air shows. In the circumstances, it appears to be very difficult to invite foreign participants to a Japan International Aerospace Show in 1988.

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CSO: 4307/007

## AEROSPACE SCIENCES

MHI TO FORM AEROSPACE SOFTWARE SUBSIDIARY

Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 pp 4-5

[Text]

Mitsubishi Heavy Industries, Ltd. (MHI) plans to establish a new subsidiary named "MHI Aerospace Systems" on December 1 this year. The new company will be specialized in developing software for the aerospace business.

For immediate needs, it will develop various software for research and development, detailed design, CAD/CAM and manufacturing control of the coming 7J7 new passenger aircraft and the H-II rocket programs.

The company which will be capitalized at ¥50 million will be 100% owned by MHI. Its head office will be set up in Daiko Plant of MHI's Nagoya Aircraft Works. In the initial year of its operation, the company will be staffed by about 30 software engineers. The staff members will be increased to about 80 over the next three years with projected annual sales of ¥600 million.

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## AEROSPACE SCIENCES

### KEIDANREN'S REQUESTS FOR SDI PARTICIPATION

Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 pp 7-8

[Text]

The Federation of Economic Organizations (Keidanren) has recently submitted its requests to the Japanese Government concerning Japan's participation in the U.S. Strategic Defense Initiative (SDI) Research Program.

The requests worked out by Keidanren's Defense Production Committee were sent to the Ministry of Foreign Affairs, the Ministry of International Trade and Industry, the Defense Agency and the Science and Technology Agency.

According to the requests, Keidanren highly evaluates the government's recent decision on formal participation in the SDI Program in terms of closer relationships between Japan and the U.S., and stronger solidarity of the Western bloc.

Keidanren has a strong interest in the research program because it has a significant potential to upgrade drastically the present level of Japan's advanced technologies. However, Japan's technology development activities are overwhelmingly promoted by the private sectors and this trend is expected to continue. The situation of technology development in Japan is different from that in the U.K. and West Germany, according to Keidanren.

The Japanese industries concerned expect the government to realize the following requests in working out the framework of Japan's participation in the SDI Program at the coming negotiations with the U.S.

- a. The technology, know-how and information owned by the Japanese participating companies should be well protected.

b. It should make it clear what the U.S. regulations of secret protection will be applied to Japan. The technology, know-how and information inherent in the Japanese participants should be excluded from such regulations.

c. The Japanese Government should establish a system to provide the Japanese participants with necessary and adequate support at each stage of participation (before contract, at contract and after contract).

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## AEROSPACE SCIENCES

### BRIEFS

**NAL TO RESUME FLIGHT TESTS OF STOL RESEARCH AIRCRAFT**--The National Aerospace Laboratory (NAL) of the Science and Technology Agency will resume flight tests of the STOL research aircraft in late November at the Air Self-Defense Force's Gifu Air Base. Kawasaki Heavy Industries, Ltd. (KHI) completed and delivered the research aircraft last March. However, the flight tests of the aircraft was postponed for about six months due to the troubles of its FJR710-600S turbofan engines. The FJR710-600S is Japan's first civil medium-size turbofan engine developed jointly by the three major aeroengine manufacturers with subsidies from the Agency of Industrial Science and Technology of the Ministry of International Trade and Industry. Since there are only six engines including spares, NAL has put off the flight tests of the four-engined STOL research aircraft to repair and test these engines. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 p 3] /13046

**MHI DEVELOPS OPTICAL DATA BUS FOR AIRCRAFT**--Mitsubishi Heavy Industries, Ltd. (MHI) announced on October 22 that it developed an airborne optical data bus system for practical use in cooperation with NEC Corp. The newly developed optical data bus system is capable of transmitting and processing in an integrated manner various data signals between instruments and computers aboard aircraft through fiber optic cables. It can be applied to the fly-by-wire next generation flight system in the future. MHI has already installed the system on its MU-300 aircraft for flight tests. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 p 4] /13046

**24TH AIRCRAFT SYMPOSIUM HELD**--The Japan Society for Aeronautical and Space Sciences held its 24th Aircraft Symposium on November 5-7 at the National Defense Academy in Yokosuka, Kanagawa Prefecture. The theme of the three-day symposium was "New Technology Leading the Way into the 21st Century." The speakers included Airbus Industrie Vice President H. Ziegler and Boeing Commercial Airplane Co. Vice President J.M. Swihard. Special lectures were delivered by Ziegler on "Advanced Technology for future Transport" and by Swihard on "New Orient Express." There were 137 lectures given at the symposium. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 p 6] /13046

**FREE-FLYER'S DEVELOPMENT WORK SHARES SETTLED**--The Space Experiment System Research and Development Organization has decided on development work share of the 13 companies participating in the preliminary design of the free-flyer (unmanned space laboratory) which will be launched by Japan's H-II

rocket and recovered by the U.S. Space Shuttle. According to the work share allotment, Mitsubishi Electric Corp. will integrate the overall systems. Toshiba Corp. is given the power supply systems. NEC Corp. is in charge of the telecommunications systems and the solar battery paddles. Fujitsu Ltd. is responsible for the ground control systems. Nippondenso Co., Ltd. will deal with space equipment for the first time with a part of the structure of the free-flyer. The total development cost of the free-flyer is estimated at about ¥30 billion. It is expected to be launched in 1992. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 pp 6-7] /13046

STA FORMS STUDY GROUP ON SPACE PLANE--With a view to developing a new system for manned space flights, the Science and Technology Agency (STA) has formed a "Space Plane Study Group" as an advisory body to the STA's Research Coordination Bureau Director General. It will study the current status of the space plane research and development activities both at home and abroad, an appropriate concept of the space plane for Japan to work on, technical problems, international cooperation and so on. The study group is expected to compile its studies into a report in early FY 1987. The conceivable choices for the Japanese space plane are: 1) an unmanned small-size space shuttle installed atop the H-II rocket; 2) a manned small-size space shuttle atop the H-II; and 3) a fully re-usable vehicle like the Orient Express. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 p 7] /13046

NEXT HELICOPTER SHOW SLATED IN APRIL 1987--All Japan Air Transport and Service Association has decided to hold the 2nd Helicopter Show on April 18-19, 1987, at Tokyo Heliport. The first show took place last May. The decision came at a helicopter subcommittee of the association on October 21. The helicopter show, which will be held with Japanese commercial helicopter operators as the central figures, is aimed at publicizing the social roles played by helicopters. The first show attracted about 1,900 visitors. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 p 6] /13046

CIVIL AVIATION COLLEGE TO INTRODUCE BEECH C90A'S--The Transport Ministry's Civil Aviation College will introduce 11 Beechcraft C90A aircraft for student training. The college will take delivery of three aircraft in April, and four each in August and December 1987. The training with these aircraft will be commenced in August next year in Sendai, Miyagi Prefecture. The Beechcraft C90As will replace the current operational 13 Beech B55s which will be sold in bidding to the public around January 1988. The college introduced the Beechcraft B55s in 1973-74 and operated them for 8,000-10,000 hours. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 p 7] /13046

CSO: 4307/008



## BIOTECHNOLOGY

### SILK COMPONENT IN JAPANESE BIOREACTOR FOR ENZYME IMMOBILIZATION

Stockholm NY TEKNIK in Swedish 30 Oct 86 p 10

[Article by Birgit Andersson]

[Text] According to Japanese researchers, ordinary natural silk may become an important component in biotechnological processes of the future.

Silk fiber has proven to be an extremely good material on which enzymes can be affixed.

Researchers at the Tokyo University of Agriculture and Technology discovered that natural silk acts as an outstanding immobilization material for enzymes.

Enzymes are proteins with the special ability to accelerate processes without being used up themselves. In biotechnology they are utilized in many different ways from pharmaceutical production, to food production, to use in detergents for breaking down dirt.

Since the enzymes are not consumed, researchers want to reuse them. This is where the immobilization technology and silk material come into use.

#### Encapsulated

In brief, immobilization means that the enzyme is bound to a carrier. It is bound to a material and, in this way, it becomes larger and easier to handle.

While an individual enzyme has a diameter of about one millionth of a millimeter, the immobilized enzyme may have a diameter of 1 mm.

The point is that it is easier to reuse the immobilized enzyme. Immobilized enzymes are better suited to continuous processes and enzymes that are affixed to a carrier material do not contaminate the final product, to mention a few examples.

There are several different methods for encapsulated and binding enzymes.

Sometimes they are attached in small balls to spaghetti-like gel strands. They can be encapsulated in a jelly-like layer surrounded by a nylon net. Various types of gelatines can be used to fix the enzyme.

The carrier material may be dextran, cellulose, porous glass, or sawdust. Now, natural silk may be used, as well.

Natural silk has been shown to be superior to other materials on one count. Enzymes bound to the fine fibers of natural silk are extremely tolerant to temperature changes. Most importantly, they are resistant to high temperatures.

The ability to withstand high temperatures is an extremely important property, since enzymes are usually so sensitive to high temperatures that they lose their ability to function.

Because of this insensitivity to heat on the part of enzymes attached to silk, researchers now believe that silk will be a future component in bioreactors, i.e. cultivating vessels for the production of biotechnological products.

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## DEFENSE INDUSTRY

### JDA STUDIES AWACS FOR OCEAN AIR DEFENSE

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 p 1

[Text]

The Japanese Defense Agency (JDA) is now studying introduction of the Boeing AWACS to beef up Japan's ocean air defense capabilities. JDA is due to study the ocean air defense system under the FY 1986-90 Medium-Term Defense Buildup Program (MDBP). With a study group on the ocean air defense system of the Defense Reform Committee, JDA is expected to reach some conclusion on it by the summer of 1987.

As for the ocean air defense capabilities, the Maritime Self-Defense Force (MSDF) plans to introduce DDG-class AEGIS ships as well as the P-3 anti-submarine patrol aircraft armed with the AWG-9/Phoenix missiles for fleet air defense.

However, as the AEW missions are already covered by the Grumman E-2C Hawkeyes of the Air Self-Defense Force (ASDF), JDA expects ASDF to be responsible for ocean air defense missions too in the future by introducing the Boeing E-3A AWACS aircraft.

As part of the sales to Japan, Boeing Aerospace Co. has already briefed ASDF on the E-3A AWACS on several occasions. C. Itoh & Co., Ltd., the sales agency for the U.S. aerospace manufacturer, has supported the AWACS sales.

According to Boeing officials, if Japan purchases the AWACS in the near future, it can introduce the CFM56-re-engined E-3As which provide higher performance, better economic efficiency and less noise and smoke.

The E-3 is highly valued by ASDF in terms of both operational performance and capabilities. Since it costs too much compared with the E-2C, JDA has given no serious consideration to introduction of the E-3. However, lured by recent strong yen against dollar, JDA seems to be interested in such expensive military aircraft of the U.S.

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CSO: 4307/008

DEFENSE INDUSTRY

NO DECISION ON FS-X SELECTION EXPECTED WITHIN YEAR

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 pp 1-2

[Text]

Defense Policy Bureau Director General M. Nishihiro of the Defense Agency (JDA) said at the Cabinet committee of the House of Representatives on October 23 that the FS-X next support fighter selection has been examined fairly and prudently, and there is no particular deadline for the selection.

His remark is considered that there will be no decision on the FS-X selection within this year. JDA had studied the FS-X program with a view to finalizing the selection by the end of this year so that the funds for the program could be included in the FY 1987 defense budget.

However, the plan to develop the FS-X with Japanese technology only is still favored by the Technical R&D Institute and engineering officials of the Air Staff Office as well as by such major Japanese aircraft manufacturers including Mitsubishi Heavy Industries, Ltd.

Moreover, in addition to proposed introduction of the Panavia Tornado, General Dynamics and McDonnell Douglas have recently proposed joint development of the FS-X with Japan. In such circumstance, JDA seems to be taking more time to examine the proposals.

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CSO: 4307/008

## DEFENSE INDUSTRY

GD, MD BRIEF ASO ON FS-X JOINT DEVELOPMENT

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 pp 2-3

[Text] The Air Staff Office (ASO) was briefed by General Dynamics (GD) and McDonnell Douglas (MD) on their respective FS-X next support fighter joint development proposals. The briefings were held during October 13-24.

The briefing by MD was given on October 13-17 by Alexander Marshall (Vice President-Marketing International, McDonnell Aircraft Co.) who elaborated on an improved version of the F-18.

GD's briefing was provided on October 20-24 by D.J. Wheaton (Vice President-Marketing, Ft. Worth Division) who proposed joint development of a new fighter based on the F-16XL.

The Air Self-Defense Force (ASDF) has now three options for the FS-X program. These are 1) purely domestic development, 2) joint development with either GD or MD, and 3) introduction of complete aircraft (including license production) from either of the two U.S. manufacturers or Panavia Aircraft of Europe. It is anticipated to take some more months to finalize the FS-X selection.

Though the Technical R&D Institute as well as ASO favor the domestic development, the Japanese Government will have to consider the current international affairs in general in deciding on the FS-X.

For example, British Defense Minister Lord Trefgarne, who recently visited Japan, said that whichever becomes the FS-X a Japan's own development or a joint development with a foreign country, or a complete or licensed introduction of Panavia Tornado, the U.K. wants to join this program in various forms such as supply of the engines and other components.

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CSO: 4307/008

DEFENSE INDUSTRY

MSDF EXPECTS TO BUILD AEGIS SHIPS IN FY 1988

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 p 3

[Text]

The Maritime Self-Defense Force (MSDF) plans to build two DDG-class AEGIS ships under the FY 1986-90 Medium-Term Defense Buildup Program (MDBP) with a view to completing a long-awaited eight-DDG fleet.

MSDF expects to introduce the same AEGIS system as the one on the U.S. Navy's DDG51-class destroyers for the two ships on FMS (foreign military sales) basis. However, it is still uncertain if the Navy will release such a state-of-the-art system to Japan.

In any case, as the number of the AEGIS ships to be procured by MSDF is too small, it is believed that domestic production of the AEGIS system is not cost effective.

MSDF is now studying the size of the AEGIS ships it will procure. As for the main engines to power the ships, MSDF is expected to choose either the Rolls-Royce marine Spey or the General Electric LM2500.

If the displacement is less than 7,500 tons, MSDF is likely to use continuously the Spey but if it exceed 8,000 tons, GE's LM2500 will have a good chance. In either case, the engine selection will depend on the size of the ships which will be configured by the mission requirements.

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CSO: 4307/008

DEFENSE INDUSTRY

MSDF'S U-36A MAKES FIRST FLIGHT

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 pp 3-4

[Text]

The first Gates Learjet U-36A (a special mission version of Learjet 36) high-speed training support aircraft of the Maritime Self-Defense Force (MSDF) made its first flight on October 18 at Tokushima Plant of Shin Meiwa Industry co., Ltd. (SMIC) which is responsible for the aircraft modification.

The aircraft operated by a SMIC pilot flew for two and a half hours to confirm its flight characteristics. Flight-tests by SMIC will continue until its delivery to MSDF in late March next year.

Gates Learjet 36A adopted by MSDF is also proposed for flight checkers of the Air Self-Defense Force. The aircraft is also proposed for the replacement of the currently operational Mitsubishi MU-2 search and rescue aircraft.

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CSO: 4307/008

## DEFENSE INDUSTRY

### TRDI'S MISSILE R&D FOR FY 1987

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 p 4

[Text] The Technical R&D Institute (TRDI) has three research and development items related with guided weapons for FY 1987. These are a new portable surface-to-air missile (SAM), a ship-to-air/ship missile (phase 2), and an air-to-air missile called XAAM-3 (phase 2). R&D activities of these items are expected to be completed in FY 1989. Further details of these R&D items are as follows:

New Portable SAM. The TRDI-designed new portable SAM will be capable of hitting enemy aircraft in a short distance with excellent front attack, and ECM capabilities. Its guidance system will be an image homing type. The new missile will replace the currently operational Stinger portable SAM.

Ship-to-Air/Ship Missile (Phase 2). This missile will be installed on surface ships and aircraft to attack hostile surface ships. Under the phase 1 of this R&D program which started in FY 1986, TRDI will develop the XSSM-1B ship-to-ship missile to replace the McDonnell Douglas Harpoon. Under the phase 2 stage that begins in FY 1987, TRDI will develop the XASM-1C air-to-ship missile which will be installed on the Lockheed P-3C anti-submarine patrol aircraft.

Air-to-Air Missile (Phase 2). This is a continuous R&D program which began in FY 1986. This air-to-air missile to be installed on fighter aircraft will be capable of countering the aircraft threat in the 1990s. It will be superior in off-bore-sight capability as well as ECM capability and hitting accuracy. It will use a "variable gain proportional navigation." Its capabilities are expected to surpass the ASRAAM now under development.

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CSO: 4307/008



## DEFENSE INDUSTRY

RR EXECUTIVE HERE TO PROMOTE ENGINE SALES TO JAPAN

Tokyo AEROSPACE JAPAN-WEEKLY in English 3 Nov 86 pp 8-9

[Text]

As one of the members of the British aerospace delegation (led by British Defense Minister Lord Trefgarne) which recently visited Japan, Derek John--Marketing Director of Rolls-Royce Ltd.--called on the Defense Agency and the Ministry of International Trade and Industry (MITI) as part of his efforts to establish even closer ties with Japan as well as to promote the engine sales. He commented on the RR engines suitable for the Japanese military programs as follows:

Japan's links with Rolls-Royce, developed over many years, could stretch well into the 21st century. Now programs like the FS-X aircraft and the SH-X maritime helicopter are suitable for engines in which RR has established a strong collaborative background.

The Turbo-Union RB199, developed by RR, MTU and Fiat Aviazione for the Tornado all-weather combat aircraft, has now achieved around half a million engine hours.

Approximately 1,600 of the present planned program of 2,350 engines have been delivered and the latest version of the engine, the Mk 104D, powers the British Aerospace Experimental Aircraft Program (EAP) technology demonstrator.

The RB199 is a contender for the Japanese Air Self-Defense Force (ASDF) FS-X requirement in either an indigenously-designed aircraft or in the Tornado. The engine's half a million hours is matched by the engine flying hours achieved by the RR/Turbomeca Adour in the Mitsubishi T-2/F-1 aircraft. These engines, license-built in Japan, are responsible for some 20% of the Adour's worldwide experience.

Selection of the RB199 would extend the successful RR/Japan relationship developed with the Adour. All the Turbo-Union companies are partners already with Japan on the International Aero Engines V2500.

The Japanese Maritime Self-Defense Force (MSDF) has 12 DD destroyers powered by RR Olympus-Tyne turbines, three DE class frigates with an Olympus-diesel combination and new DDG guided missile destroyer powered by Spey and Olympus turbines. The Spey is the latest Marine gas turbine to be offered by RR and Japan has ordered a series of new DD destroyers, which will use Spey power.

Japan has also embarked on the SH-X maritime helicopter project. Based on a Sikorsky Sea Hawk airframe, but with Japanese-designed avionics, the SH-X is an application ideally suited to the new RR/Turbomeca RTM 322 turboshaft engine.

The RTM 322, now being flight-tested in a Sikorsky S-70C civil variant of the Black Hawk, has achieved 2,000 flight and bench test hours, including 300 accelerated mission endurance hours, since the engine first ran less than two years ago.

The engine is directly interchangeable with the General Electric T700 and is more powerful, rated at 2,100 shaft horsepower with considerable growth potential. The U.S. Navy is currently making arrangements to flight-test the RTM 322 in a Sea Hawk in 1987.

Another RR program with strong U.S. links is the Pegasus vectored thrust turbofan, now in service with the U.S. Marine Corps in the AV-8B Harrier II aircraft. The U.K. version, the Harrier GRS, enters service in 1987. The Pegasus is also in service in the Harrier in the U.K., and in Sea Harriers in the U.K., India and Spain.

RR links with Japan cover a wide spectrum of gas turbines, and the relationship has evolved since the early 1960s from the direct purchase of equipment, to manufacture of engines under license, direct involvement in parts manufacturing for RR and subsequently to full joint collaboration as with the V2500.

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CSO: 4307/008

## DEFENSE INDUSTRY

HH-X MAY BE PUT OFF TILL V-22 BECOMES AVAILABLE

Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 p 2

[Text] As the Air Self-Defense Force (ASDF) decided to request the Kawasaki/Vertol KV-107IIA helicopters again under the FY 1987 budget, its HH-X next rescue helicopter program has been postponed a year from the initial plan. However, the Air Staff Office (ASO) seems to be plagued whether or not to request the Sikorsky HH-60 for the HH-X next year.

Although ASO initially insisted on introduction of the HH-60, some officials still believe this helicopter's cabin space is not large enough for rescue missions. Moreover, if ASDF introduces the HH-60 now, ASO is concerned that it will be difficult to introduce the V-22 Osprey which the U.S. Marine Corps will start operating in 1993.

If there is no decisive shortcomings in the present KV-107IIA helicopters equipped with composite blades, ASO might as well keep the HH-X program pending until the V-22 Osprey becomes available, according to some officials.

ASDF was expected to select the Mitsubishi/Sikorsky SH-60J, which is already adopted by the Maritime Self-Defense Force (MSDF), for the HH-X with some modifications so that the three services of the Self-Defense Forces will use the same helicopters for rescue missions in the future. This was believed to be very cost effective.

Recently, however, the Maritime Staff Office (MSO) seems to be interested in the larger HH-53E rather than the HH-60 as its future rescue helicopters. It has become unlikely that the three services will use the same helicopter.

MSO seems to prefer the HH-53E to the HH-60 because MSDF's helicopters should be capable of rescuing a number of crew in case of a P-3C accident, unlike ASDF's HH-X which is aimed at rescuing pilots only.

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CSO: 4307/007

BRIEFS

GD IMPLIES TWIN-ENGINE F-16 FOR FS-X--As reported in the previous issue of Aerospace Japan-Weekly (November 3), McDonnell Douglas (MD) and General Dynamics (GD) briefed the Japanese Defense Agency (JDA) on their respective FS-X next support fighter joint development proposals during October 13-24. MD's briefing was reportedly centered on an improved version of the F/A-18 but the company refrained from making detailed presentation, stating that such presentation will be made if and when Japan decides to introduce the F/A-18. GD, on the other hand, is said to have expressed its intention of cooperating in any kinds of joint development Japan wants to see. Showing a flexible attitude toward the FS-X, GD implied possibility of modifying jointly the F-16 into a twin-engined fighter, if Japan prefers to do so. JDA, which still wants purely domestic development of the FS-X, seems to be in a difficult position. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 p 1] /13046

ASDF TO MODERNIZE C-1 TRANSPORT--The Air Self-Defense Force (ASDF) has decided to modernize its Kawasaki C-1 transports to improve the aircraft's navigation capabilities. The modernization work will be contracted to Kawasaki Heavy Industries, Ltd. (KHI) early next year. Under the modernization program, the C-1's navigation equipment will be changed, including the Doppler navigation system to be replaced with the IRS developed by Japan Aviation Electronics Industry, Ltd., the manual LORAN receiver with an automatic type, and the navigation weather radar with an improved model. The cockpit layout will be changed accordingly. ASDF has other ideas to improve the aircraft such as adding fuel tanks inside the center wing box (this has already been applied to some C-1s), re-engining the aircraft with more fuel efficient engines to improve the flight range by about 50%, and stretching the fuselage to increase the payload up to 12 tons. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 p 1] /13046

SH-60J TO BE DELIVERED IN APRIL 1989--The SH-60J new ASW helicopter program has been carried forward by the Technical R&D Institute (TRDI) in cooperation with Mitsubishi Heavy Industries, Ltd. (MHI). The production model of the helicopter is expected to be available for procurement by the Maritime Self-Defense Force (MSDF) beginning in FY 1988. The first prototype helicopter is due to undergo technical tests on a 3,400-ton DD destroyer after its first flight in late September 1987. The second helicopter will be delivered to the Defense Agency in April 1989 and the first helicopter in June of the same

year. These will undergo operational tests by MSDF's 51st Air Development Squadron. MSDF plans to procure 36 SH-60J helicopters under the current FY 1986-90 Medium-Term Defense Buildup Program. These will be delivered in and after FY 1990 for deployment on MSDF's DDH and DD destroyers. About 50 shipborne-type SH-60Js will be necessary to replace the presently operational HSS-2 helicopters. [Text] [Tokyo AEROSPACE JAPAN-WEEKLY in English 10 Nov 86 pp 2-3] /13046

CSO: 4307/007

## ENERGY

### FY 1986 CRUDE OIL CONSUMPTION REPORTS, FY 1987 PROJECTIONS

Tokyo MARUBENI PETROLEUM REPORT in English 11 Nov 86 pp 1-5

[Text] OPEC crude oil prices will average between \$12 and \$16 a barrel in 1987

#### - Projections by the Institute of Energy Economics (IEE)

On October 17, the IEE, a Tokyo-based research institute, released the results of a study concerning the outlook for the short-term oil situation. According to this report, in 1987 the free world's oil demand will total 47 million barrels a day, up a minuscule 1% over 1986. Given this demand level, the report projects OPEC crude production using three supply scenarios, with the average OPEC crude price in 1987 predicted to be \$14 a barrel in the standard case, \$12 a barrel in the low-price case and \$16 a barrel in the high-price case.

Behind these price projections are the following production levels:

# FREE WORLD OIL DEMAND AND PRICE PROJECTIONS FOR 1987

(Unit: millions of B/D)

	Calendar Year		
	1985 (act.)	1986 (est.)	1987 (proj.)
Oil demand	45.6	46.5	47.0
Oil supply from non-OPEC nations (incl. net exports from Communist bloc, and NGL)	29.5	29.6	29.9
Standard case			
OPEC crude output	15.9	17.7	16.8
Change in stocks	-0.2	0.9	-0.3
Projected OPEC average crude price	--	--	\$14/bbl
Low-price case			
OPEC crude output	15.9	17.7	17.5
Change in stocks	-0.2	0.9	0.4
Projected OPEC average crude price	--	--	\$12/bbl
High-price case			
OPEC crude output	15.0	17.7	16.0
Change in stocks	-0.2	0.9	-1.1
Projected OPEC average crude price	--	--	\$16/bbl

Standard case: This case will pertain if the production ceiling agreed to by OPEC members in September and October 1986 - 16.8 million barrels a day (with 2 million-barrel-a-day output for Iraq) - is continued and observed through 1987.

Low-price case: In this case, OPEC crude production in 1987 increases to 17.5 million barrels a day, further increasing oil stocks worldwide.

High-price case: In this case, OPEC steps up its production cuts, reducing output to 16 million barrels a day in 1987 and thus forcing inventory draw-downs throughout the world.

The IEE also projects that crude oil production by non-OPEC nations in 1987, including production increases by such oil producing countries as Norway, and net exports from the Communist bloc countries will total 29.9 million barrels a day, a gain of 0.3 million barrels a day, or 1%, over 1986.

Japan's crude import price in the first half of fiscal 1986 averaged \$12.49/bbl

The price of crude oil imported by Japan in the first half of fiscal 1986 (April-September 1986) averaged \$12.49 a barrel on a CIF Japan basis, down \$15.46 a barrel, or 55.3%, from the same half of the previous year, according to the Ministry of Finance. This steep decline was due to the world oil market collapse triggered by OPEC's announcement late last year of its intention to recover market share.

The CIF prices for crude shipments landed in Japan in August and September were particularly low, only slightly above the \$10 a barrel mark - \$10.34 for August and \$10.84 for September. This was because purchases of these crudes were made in July, when the overseas markets hit bottom.

CIF PRICES AND CUSTOMS-CLEARED VOLUMES OF CRUDE OIL IMPORTED  
BY JAPAN IN THE FIRST HALF OF FY1986

1986	Customs-Cleared Volume (mill. of bbl)	\$/bbl	¥/kl	Exchange Rate (¥/\$)
Apr.	104.07 (108.21)	16.46 (28.34)	18,489 (45,371)	178.62 (254.49)
May	85.44 (101.39)	12.89 (28.32)	13,548 (44,769)	167.08 (251.36)
June	83.93 (74.30)	12.34 (28.36)	13,144 (44,636)	169.29 (250.26)
July	90.47 (90.00)	11.88 (27.90)	12,191 (43,213)	163.17 (246.22)
Aug.	104.13 (91.03)	10.34 (27.43)	10,081 (41,045)	155.04 (237.92)
Sept.	95.04 (95.07)	10.84 (27.37)	10,545 (41,173)	154.66 (239.20)
Average for First Half	563.09 (560.00)	12.49 (27.95)	13,035 (43,400)	N.A. (246.84)

Note: Figures in ( ) are those for the same half of the previous fiscal year.



Meanwhile, with the yen sharply appreciating in 1986, the yen-dominated CIF price in the first half also fell dramatically, to ¥13,035 a kiloliter, a drop of ¥30,365 a kiloliter, or a 70.0%, from a year earlier.

The customs-cleared volume, on the other hand, rose by a fractional 0.6%, to 563.09 million barrels (or 3,080 barrels a day).

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CSO: 4307/006

## ENERGY

### ELECTRIC POWER STUDY COMMITTEE PUBLISHES OUTLOOK REPORT

Tokyo MARUBENI PETROLEUM REPORT in English 11 Nov 86 pp 5-7

[Text] A report titled "The 21st Century Vision for Electric Power" was published by the vision study committee at the Central Electric Power Council, a body established by Japan's nine major electric utilities and the Electric Power Development Co., Ltd. This report, submitted to the council, depicts the ways in which Japan's electric power companies should be operating in the 21st century.

In Japan, the Committee for Energy Policy Promotion, formed mainly by the private sector, is engaged in the study of energy-related problems facing private industrial sectors and the promotion of necessary measures. With this committee playing the central role, energy visions for the 21st century are now being formulated in all industrial sectors. The "21st Century Vision" report is a result of these efforts.

According to this report, the Japanese economy in the 21st century will maintain its vitality, with technology-intensive industries providing the forward thrust. As the economy matures, however, the report states that growth will slow down, with the real economic growth rate declining from an annual average of about 4% for the current century to a projected 2.2% in the period 2000-2030. Accordingly, it is projected that the average annual growth rate of energy demand will dwindle from 2.2% in the 20th century to 0.3-0.9% in 2000-2030.

Amid such a stagnation in energy demand, however, 21st century society will seek in energy such factors as convenience of use, cleanness, safety and economy, says the report. And it points out that the form of energy that can satisfy all these requirements is none other than electric power. The growth rate of electricity demand will average a projected 2.5% a year until 1995 and then edge down to 1.2-1.7% a year through 2030. The report says that electricity demand will most likely increase in the household and commercial sectors, while significant growth in industrial demand cannot be expected.

By type of power plant, nuclear power, which accounted for 26% of all electricity generated in 1985, will supply 60% in 2030, according to the report. During this period, oil-fired thermal power generation will plummet from 29% to 5%, with thermal power generation as a whole, including coal-fired

generation, projected to be halved from 60% to 30%. The report predicts that in the 21st century, nuclear power will become the primary electric energy source for Japan.

# Japanese Oil Statistics

Import of Crude Oil by sources

(Unit: 1000 BBL)

	Sep.		Jan.-Sep.		Share in 1985 %
	Volume	Share %	Volume	Share %	
Saudi Arabia	19,237	19.0	128,271	14.0	17.4
Kuwait	2,012	2.0	29,080	3.2	1.3
Neutral Zone	8,744	8.6	50,069	5.5	6.5
Iran	4,197	4.1	61,544	6.7	7.2
Iraq	2,012	2.0	44,192	4.8	2.1
U.A.E.	21,391	21.1	203,970	22.3	21.3
Qatar	2,959	2.9	47,867	5.2	5.8
Oman	6,324	6.2	69,951	7.6	8.8
Others	-	-	230	0.0	-
Middle East	66,876	65.9	635,174	69.3	70.4
Brunei	356	0.3	10,977	1.2	1.6
Indonesia	13,144	13.0	102,925	11.3	11.4
Malaysia	4,338	4.3	37,902	4.1	3.3
S.E. & F.E. Asia	17,838	17.6	151,804	16.6	16.3
Mexico	6,447	6.4	51,110	5.6	4.1
Others	238	0.2	1,992	0.2	0.4
North & South America	6,685	6.6	53,102	5.8	4.5
Nigeria	-	-	-	-	-
Lybia	-	-	-	-	-
Algeria	-	-	-	-	-
Others	-	-	4,437	0.5	1.2
Africa	-	-	4,437	0.5	1.2
China	9,740	9.6	63,323	6.9	6.5
U.S.S.R.	300	0.3	717	0.1	0.1
Others	-	-	7,646	0.8	1.0
Total	101,439	100.0	916,203	100.0	100.0

## NEW MATERIALS

### POLYMER SEPARATION FILM R&D DISCUSSED

Tokyo KOGYO GIJUTSU in Japanese Sep 86 pp 26, 27

[Text] Next-Generation Industrial Technology Planning Center, Agency of Industrial Science & Technology

Research and development was begun in fiscal 1981 on "highly efficient polymer separating film materials" as part of the Next-Generation Industrial Base-Technology Development Project, for the purpose of developing highly efficient liquid separating films and gas separating films, together with technologies pertaining thereto, to facilitate the separation, concentration, and refining of substances that have been very difficult to separate and refine due to their extremely similar physical and chemical properties, in order to develop highly efficient, energy-saving separation processes for the chemical industry, to replace the conventional separation methods, which consume enormous amounts of energy, and with the goal of establishing the base-technologies pertaining to revolutionary, highly efficient, separation-film materials.

This R&D project is supposed to last 10 years, divided into three stages, namely Stage I (1981 - 1984), Stage II (1985 - 1987), and Stage III (1988 - 1990).

This research and development is being conducted in three research laboratories under the Agency of Industrial Science & Technology, one university, and nine companies organized under the Molecular Base-Technology Research Union, thus constituting a joint industrial/academic/governmental endeavor.

A synopsis of the Stage I research was reported in the July, 1984 edition of this magazine, so we turn here to the results of that Stage I research and development, and give a synopsis of the Stage II research.

In Stage I, basic research pertaining to film separation was performed systematically, with the elucidation of the factors controlling separation films being the major R&D theme. The main gains achieved were as follows.

(1) It was theoretically demonstrated that the osmotic gasification method of water/ethanol separation is more energy-conserving than the conventional distillation methods. Water-selective permeation films exhibiting outstanding separation ability were obtained using film fabrication techniques

that control the film structure, and the possibility of practically implementing alcohol concentration was verified.

(2) It was discovered that amino-acid optical isomers could be separated by means of impregnation-type liquid films.

(3) Film exhibiting good separation abilities was obtained for the separation of carbon monoxide and nitrogen using the fluid carrier method.

(4) A method was perfected for measuring selective permeability for gases, using gravimetric methods, under high temperatures and pressures.

(5) Much knowledge pertaining to membrane-controlling factors was gained as a permeation model was constructed for highly porous film, the correlation between separation performance and the microstructure of films was investigated, and functional groups were discovered which enhance selective permeability.

Based on these findings, the objective now is to achieve the necessary film performance to convert existing separation methods such as distillation and deep-freezing to film-separation processes, selecting liquid systems (such as water/ethanol) and gas systems (such as nitrogen/oxygen) as models of separation subject systems.

For Stage II, in order to enhance film performance and develop film-producing technologies, etc., the project has been reorganized along five themes, namely (1) basic separation technology, (2) research on film materials and film processing technologies, (3) research on film-separation element technologies, (4) evaluation techniques, and (5) general survey research. Each of these themes is summarized below.

Themes (1) and (4) are being handled by the national research laboratories and the university, while (2), (3), and (4) have been commissioned to the Molecular Base-Technology Research Union.

#### (1) Basic Separation Technology

Researchers are seeking here to elucidate the permeation mechanisms and membrane-deterioration mechanisms for the new anhydrous separation films for recovering ethanol from fermentation processes and for the impregnation-type liquid films that can separate amino-acid optical isomers, develop separation-process element technologies, liquid-film regeneration techniques, and activation process techniques for separation-film surfaces that will contribute to separation, etc., establish new basic separation technology, and cultivate the applications fields therefor.

#### (2) Research on Film Materials, Film Processing Technologies

Researchers are working to design an ideal film structure for improving separation factors and to develop thin-film technologies that will enhance

permeation performance, in order to develop separation films that will satisfy the separation-performance parameters being targeted. In gas separation systems, particular emphasis is being given to thin-film technologies and the search for substances that exhibit separation functionality, while in liquid systems the emphasis is on film fabrication techniques and forming active layers in composite films.

### (3) Research on Film-Separation Element Technologies

Studies are being done on hydrophobic porous films that use temperature differentials as the separation driving force, and new separation processes that use granular liquid films in liquid mixtures, etc.

### (4) Evaluation Techniques

In order to perfect basic techniques for evaluating the separation performance of separation films, studies are being done to elucidate separation mechanisms and to investigate the correlations between solubility parameters and separation performance, selective permeability and film structure factors, and affinity and separation performance. Studies are also being done to develop evaluation techniques based on these findings and to design experimental evaluation equipment.

### (5) General Survey Research

In order to efficiently promote the R&D efforts noted above, surveys of related technological development are conducted and research symposia are sponsored.

Thus far, under the auspices of this research and development project, factors controlling film separation have been elucidated, new separation-function films have been developed for separating amino-acid optical isomers, etc., and films have been developed which exhibit outstanding performance in separating alcohol, acetic acid, oxygen, and carbon monoxide, etc. Much know-how has also been accumulated pertaining to basic separation technology, film-material design technology, film manufacturing and processing technologies, and separation-film evaluating techniques.

Building on these achievements, active research exchange is being promoted between researchers, and efforts are being made to raise the level of film manufacturing and processing technology to further enhance film performance, to perfect highly reliable, standardized evaluation techniques, and to accumulate more know-how and basic data for designing and evaluating separation films. Research and development that is oriented toward practical applications is also being promoted.

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CSO: 4306/3123

## SCIENCE AND TECHNOLOGY POLICY

### FY 87 MITI S&T-RELATED POLICIES AND BUDGET REQUESTS

Tokyo JITA NEWS in Japanese Oct 86 pp 4-11

[Text] The world economy today is faced with a multitude of imbalances. The United States, until now the driving force behind the world economic expansion, is suffering from continuing massive deficits in its recurring revenue and expenses, notwithstanding positive factors such as the correction of the high-dollar problem. The future prospects of the U.S. economy remain uncertain. The European nations continue to suffer from high unemployment rates. These circumstances plus Japan's large trade surpluses, have given rise to a strong protectionist sentiment in Europe and the U.S. Further, the mounting debts by developing nations remain worrisome. To ensure a sustained growth of the world economy while correcting these imbalances, it is necessary that Japan, which represents a tenth of the worldwide economy, take a positive attitude to utilize its economic vitality toward the growth of the world economy by adopting economic policies aimed at high growth by encouraging domestic consumption.

An urgent task facing the Japanese society and economy is to overcome the widening impact of deflation precipitated by the rapid rise of the yen. In the medium to long term, the Japanese society and economy are undergoing far-reaching, diverse changes that are bringing about a fundamental metamorphosis in its basic structure, including the increasing internationalization, rapid advances in technology and the use of information resources, changes in the public perception of values, and an aging population. It is necessary to lay a foundation for a long-term growth capable of dealing with these changes appropriately as the nation moves toward the 21st century, while providing affluent living for all.

Given the above requirements, this paper proposes the following measures as immediate economic management policies:

- (1) Stabilization of the exchange rate in a manner that reflects fundamental realities of the economy.
- (2) Solving the current "strong yen" deflation through an expansion in domestic consumption. This requires bold domestic consumption expansion policies, such as increased funding of government-supported private sector projects.

(3) A substantial expansion in the aid to the small enterprises suffering from the effect of the high yen.

Further, the 1987 trade and industry policies should be executed accurately and effectively by taking into consideration the following fundamental requirements:

(1) Promotion of an industrial structure based on an international viewpoint. The reform of our industrial structure should be pursued with a view toward making it less dependent on exports and more consistent with requirements of the international economy. It is necessary to build a system of international specialization by encouraging imports and overseas investments. Toward this end, a high growth rate based on domestic consumption and the creation of jobs through technological developments, the fostering of information utilization, and expansion of new business opportunities must be provided for.

(2) Making contributions toward a vigorous international economy and society. Japan is expected to make contributions, consistent with its economic status, toward the maintenance of free trade, fostering international joint research and development, and in extending economic cooperation.

(3) Provision of aid to small businesses to enable them to adapt vigorously to harsh changes in the economic environment both here and abroad. Small businesses are facing harsh changes in the economic environment brought about by internationalization, technological advances, and increasing use of information technologies. Therefore, it is necessary to pursue policies aimed at the transformation of the business character of small firms, and to provide measures that will enable them to deal flexibly with environmental changes by making full use of the creativity and dynamism of small firms.

(4) Expansion of new industrial frontiers and laying a foundation for the medium and long-term growth of our economy. Japan is facing the advent of a new industrial society in the flow of technological innovations spearheaded by information technologies. Also, to promote the international cooperation of the industrial structure in response to various changes, an exploration of the frontier of industrial society is expected through the integration of knowledge and technologies in different fields.

(5) Long-term execution of resource and energy policies. Although the current decline in oil prices is producing a favorable overall impact on the world economy, a sustained depression of oil prices could have deleterious effects on energy resource development, the development of new energy technologies, and energy conservation, which could hasten the arrival of another energy supply crunch. In view of this fact, it is necessary to steadily pursue comprehensive energy resource policies from mid and long-term perspectives.

(6) Realization of comfortable, affluent living for all with well-balanced development of national land resources. It is necessary to provide for the creation of affluent consumptive life consistent with changes in perceptions



of value and changes in the people's lifestyles, including the increasing emphasis on individuality.

Given the above requirements, a smooth adjustment must be made of economic and industrial structures to ensure an adept and dynamic response to changes in the economic environment surrounding Japan. It is necessary to lay a foundation for long-term economic and societal development and to make contributions to the international society.

The following describes policies related mainly to technological development.

#### I. Promotion of an Industrial Structure Policy Based on an International Perspective

1. Smoothing the Process of Industrial Structure Control Measures, including legal measures, will be taken to help remake the industrial structure better in harmony with the international economy, to ease the transition of firms to new fields of business necessitated by significant changes in economic conditions here and abroad such as the rapid rise in the value of the yen, to provide for smooth execution of business initiatives related to adjustments such as the establishment of overseas production facilities, to aid the small businesses affected by such adjustments, and to alleviate the impact on local economies. For these purposes, an "Economic Structure Adjustment Fund" (a tentative name) will be established.

A prerequisite to improving the international compatibility of the industrial structure is the development of new industrial frontiers to ensure an adequate level of job availability within Japan. For this purpose, measures will be taken to foster technological developments, an increased use of information resources, and the expansion of new fields of business.

#### 2. Promotion of Investment Exchanges

- (1) Facilitating direct overseas investments
- (2) Facilitating direct investments in Japan by foreign firms

#### 3. Promotion of Industrial Cooperation

4. Promotion of Domestic Consumption through the Use of the Private Sector. A substantial increase in grants-in-aid will be made based on the Interim Private Sector Revitalization Act [PSRA] to augment designated facilities through the use of the private sector. The purpose of this measure will be to provide for the expansion of domestic consumption and revitalization of the local economies, and to contribute to the long-term socio-economic growth of Japan by providing appropriate responses to technological innovations, increased use of information resources, internationalization, and increased desire for leisure by the people of Japan.

#### 5. Encouraging the Importation of Manufactured Goods

#### II. Contribution to the Construction of a Vigorous International Economy and Society

1. Promotion of International Cooperation in Research and Development  
Essential to making a contribution toward the vitalization of the world economy through the use of technological and economic prowess and creative technology development is the active promotion of research exchange with various nations. For this purpose, provisions will be made to promote international joint research projects, to promote the appointment of foreign personnel to government-funded positions based on the Research Exchange Promotion Act, and to further the extension of research cooperation to developing countries.

A large-scale international joint project (the Human Frontier Science Program) in the area of biological function application technology is likely to assume the position of mainstream importance in future technological developments. The project will be proposed to the world community, and provisions will be made for its active execution in cooperation with relevant ministries and agencies.

Budget:

- o Seed money for the Human Frontier Science Program: Y 50 million (M) (0)
- o From the science and technology promotion adjustment fund  
for the support of international symposia related to  
the Human Frontier Science Program: Y 150 M
- o Designated international  
joint research projects: Y 60 M (Y 40 M)
- o Extreme environmental condition-tolerant  
robots as part of the Large-Scale Industrial  
Technology R&D (includes EDEPE/PPCPE): Y 2.55 billion (B) (Y 2.41 B)
- o International industrial technology  
research: Y 190 M (Y 180 M)
- o Research cooperation promotion contracts: Y 650 M (Y 490 M)
- o Grants for R&D cooperation projects Y 140 M (Y 50 M)

Tax Code Revision:

- o Establishment of tax deduction allowances for contributions made to a public trust fund (International Research Cooperation Japan Trust Fund) for inviting researchers from foreign countries.

2. Execution of a "New Round" program

3. Extension of economic cooperation to help developing countries attain economic independence.

Substantial increases in existing economic/technological cooperation programs must be made and aid for the industrialization of designated nations must be given, especially to Asian nations.

Budget:

- o Aid for research on the development of machine translation systems to be used by neighboring nations: Y 180 M (0)

4. Promotion of a Pan-Pacific plan

5. Establishment of a Trade and Industry Research Institute (tentative name)  
This seeks to strengthen the theoretical basis for trade and industry policies and to help increase the understanding of Japan by foreigners through the promotion of research work exchange opportunities.

### III. Programs to Aid Small Businesses in Response to Changes in Business Climate Here and Abroad

#### 1. Facilitating the Transformation of the Industrial Structure to a Structure More in Harmony with International Requirements

(1) Aid to small businesses to ease their structural transformations  
Budget:

o Technology pioneer-nurturing program of the local technology vitalization program: Y 250 M (Y 190 M)

(2) Increasing the aid to local small businesses

(3) Establishing an environment that facilitates direct overseas investments by small businesses

#### 2. Augmenting Managerial Resources in Response to Changes in the Economic Climate

##### Budget Items:

o Local system technology development program out of the Local Technology Vitalization Program Grant: Y 800 M (Y 460 M)

o Technology improvement grant out of the technology promotion grant: Y 1.44 B (Y 1.4 B)

##### Financial Investments:

o Advanced technology promotion loan  
(Small business loan fund)

(Part of a ceiling of Y 37 B for financing technology/information utilization promotion loans)

(Part of a ceiling of Y 30 B for financing technology/information utilization promotion loans)

o Advanced technology promotion loans (Small Business Loan Fund)

(Part of a ceiling of Y 37 B for financing technology/information utilization promotion loans)

(Part of a ceiling of Y 30 B for financing technology/information utilization promotion loans)

##### Financial Investments:

o Information base-augmentation loans (Small Business Loan Fund)

(Part of a ceiling of Y 37 B for financing technology/information utilization promotion loans)

(Part of a ceiling of Y 30 B for financing technology/information utilization promotion loans)

o Information technology promotion loans for small businesses  
(National Loan Fund)

(Part of a ceiling of Y 13 B for financing information technology and energy conservation promotion for small businesses)

(Part of a ceiling of Y 11 B for financing information technology and energy conservation promotion for small businesses)

3. Augmenting the Managerial Base to Ensure Stable Growth
4. Ensuring Independent Growth of Small Businesses

#### IV. Expansion of Industrial New Frontiers

##### 1. Promotion of Technological Developments

(1) Augmentation and strengthening of technology development system  
Technological development is essential to the long-term growth of the nation and to the ability to make creative contributions to the world economy. In particular, it is necessary to provide jobs in Japan by active pursuit of technological development and exploration of new frontiers in industry as the transformation of the industrial structure advances to become more harmonious with international requirements. Toward these goals, the Base Technology Research Promotion Center Program will be expanded and the systems of private sector technology development, large-scale industrial technology R&D, and new energy technology R&D will be strengthened.

a. An R&D System for the Next Generation of Industrial Base Technologies  
Support will be provided to ensure the steady progress of 11 on-going R&D topics which have moved on to Phase II. Also, research efforts in photon reaction materials, started in 1985, and those in bio-devices, to be undertaken during 1986, will be expanded.

Ceramic turbine element technology development will be conducted as a part of fine ceramics R&D.

##### Budget:

o R&D of the next generation of industrial base technologies (includes EDEPE):

Y 6.49 B (Y 6.51 B)

b. Large-Scale Industrial Technology R&D System ("Large-Scale Projects")  
The execution of on-going projects, including the expansion of the "Advanced Processing Systems" project started in 1986 into a full-scale R&D effort will be made in order to respond to new needs of industry and to promote the research and development of advanced technologies.

##### Budget:

o Large-Scale Industrial Technology R&D (includes PPCPE, PRCPE, and EDEPE):

Y 15.75 B (Y 15.18 B)

Of these amounts, the Advanced Processing Systems  
Research represents:

Y 1.12 B (Y 20 M)

c. New Energy Technology R&D System (the "Sunshine Project")

This seeks to expand the energy R&D by using the "New Energy Integrated Development Organization" as the core, to speed up the development of new energy resources as a significant part of the total energy supply.

Budget:

- o New energy technology R&D (the "Sunshine Project") (includes PRCPE and EDEPE):  
Y 33.27B (Y 37.64B)

d. Energy Conservation Technology R&D (the "Moonlight Project") Continued vigorous execution will be made of the "Moonlight" project, including the expansion of R&D of large-scale energy conservation technologies.

Budget:

- o Energy Conservation technology R&D (the "Moonlight" project) (includes PRCPE and EDEPE):  
Y 11.89 B (Y 12.27B)

e. Medical Care Equipment Technology R&D

Continued efforts will be pursued for the development of four types of medical care equipment and four types of equipment for human well-being. In consideration of the urgency of the anti-cancer measure and pursuant to the policies adopted in June, 1986, to provide for an aging society, the following R&D efforts will be initiated during 1987: automatic leucocyte classification system, and a mechanical mat for the prevention of bedsores.

Budget:

- o R&D of medical care/human welfare equipment:  
Y 700 M (Y 680 M)

f. Expansion of Base Technology Research Promotion Center The amount of loans granted by the specially certified Base Technology Research Promotion Center, established on 1 October, 1985, pursuant to the Base Technology Research Promotion Act, will be expanded to promote private sector technology development efforts.

- o Base Technology Research Promotion Center (capital investments & loans):  
Y 29 B (Y 20.5 B)

Taxation Provisions

- o Establishment of a Base Technology Research Investment Risk Reserve Fund

(2) Promotion of international research and development efforts (see Section II)

(3) Execution of technology development efforts in the various fields

Priority will be given to the following areas in future technology development efforts:

a. Space development and the development of aircraft-related technologies  
Space and aircraft represent advanced technology areas with high future growth potential and large ripple effects. Accordingly, the development of an

unmanned space experimental system (space experimentation/observation free flyer SFU) and an earth resource satellite (ERS-1) will be conducted. The international joint development of civilian aircraft engine V2500 and civilian cargo plane YXX will be conducted through the use of designated development promotion agencies. Testing and research on a highly energy-efficient engine for the next generation of aircraft and the expansion of the base for space technology will be conducted.

**Budget:**

- o Development of an unmanned space experimental system (space experimentas, observation free flyers) (includes EDEPE): Y 1.75 B (Y 180 M)
- o R&D of resource exploration monitoring system (includes PPCPE): Y 5.19 B (Y 4.49 B)
- o R&D of petroleum resource remote detection technology (exclusive of R&D of resource exploration monitoring system) (PPCPE): Y 1.42 B (Y 1.34 B)
- o Promotion of international joint development of aircraft: Y 4.7 B (Y 4.7 B)

**Financial Investments:**

- o Promotion of international joint development of aircraft (loans from Japan Development Bank) Y 25.6 B  
(Industrial technology promotion domestic bond with a Y 56 B ceiling)
- o Augmentation of a base in space industry (loans from Japan Development Bank): Y 5 B (0)

a. Development of Information-Related Technologies The realization of an advanced information society requires technological developments appropriate to its needs. Therefore, base technology development projects will be carried out in fifth generation computers, hardware-independent database systems, and new functional elements (bio-elements).

**Budget:**

- o Computer base technology development (Fifth Generation Computer, includes EDEPE): Y 5.65 B (Y 5.49 B)
- o Hardware-independent database systems as part of the Large-Scale Industrial Technology R&D: Y 1.11 B (Y 830 M)
- o Scientific/engineering super computer systems (includes PPCPE and EDEPE): Y 3.07 B (Y 2.89 B)
- o New functional element as part of R&D of the next generation of industrial base technologies: Y 1.44 B (Y 1.54 B)

**Financial Investments:**

- o Information system hardware reliability improvement (Japan Development Bank loans): Y 13 B  
(Part of information promotion program with a Y 85 B ceiling)

c. R&D of New Materials-Related Technologies

The technology of fine ceramics, new glass, and superconducting materials will be developed, the demand for which is anticipated to increase with the growth of advanced technologies.

Budget:

- o New materials as part of the R&D of the next generation of industrial base technologies (includes EDEPE): Y 3.89 B (Y 3.57 B)
- o Feasibility study on superconducting electrical generators as part of the "Moonlight" project (EDEPE): Y 100 M (Y 50 M)
- o Aid to fine ceramics/new glass industries: Y 20 M (Y 10 M)

d. Development of Biotechnology-Related Technologies Biotechnology is making rapid strides, with a great potential for a ripple effect. High-volume cell culture and related projects will be carried out. As a new program, the development of high efficiency alcohol fermentation technology will be undertaken. Also, work will be undertaken to assure the safety of recombinant DNA application in the natural environment.

Budget:

- o Development of continuous alcohol fermentation technology by use of a high productivity yeast (AMPSA): Y 290 M (0)
- o Fuel alcohol technology (PRCPE): Y 530 M (Y 470 M)
- o Biotechnology as part of the R&D of the next generation of industrial base technologies: Y 1.14 B (Y 1.22 B)
- o Aid to bio-industries: Y 170 M (Y 110 M)

e. Technology Developments for the Improvement of Manufacturing Process Efficiencies

Technology development projects, including super-advanced processing systems will be conducted to answer various needs such as improving the manufacturing process efficiencies and improving the capabilities of equipment used in advanced technology industries. Technology development will be undertaken for speeding up the introduction of factory automation (FA) in actual production sites.

Budget:

- o R&D of systems for the interconnection of FA plants: Y 40 M (0)

(4) Development of a Long-Term Technology Development Strategy

Various types of technical information will be collected and analyzed to aid the efficient execution of technology development, both at the private sector and government levels. Technology development trends will be monitored continuously and in quantitative terms in order to determine the types of technology development to be pursued and the role to be played by Japan in future technology development.

Budget:

- o Study and development of a domestic and international research prediction system: Y 10 M (0)

(5) Promotion of Government, Industry, and Academia Cooperation

Efficient execution of basic research requires the sharing of accumulated expertise available in the government, industry, and academia, and the dynamic execution of joint research efforts. Recently a Research Exchange Promotion Act has been enacted to provide a basis for the promotion of research exchange between the government and private sector. Research exchange will be promoted through active application of this system, the vitalization of a government-private sector joint research system, and through the expansion of infrastructure for research exchange.

Budget:

- o Government/private sector joint research: Y 450 M (Y 230 M)
- o Priority area technology R&D: Y 240 M (Y 240 M)

(6) Augmentation of test laboratories

The national test laboratories which are conducting leading-edge basic R&D are anticipated to play increasingly important roles as the importance of basic technology development increases. Increases in personnel, budgetary, and facility resources will be provided in order to expand and vitalize the capabilities of these laboratories.

Budget:

- o Test laboratory special research funds: Y 2.57 B (Y 2.57 B)
- o Test laboratory recurring research funds: Y 3.47 B (Y 3.48 B)
- o Test laboratory facility maintenance/management: Y 5.86 B (Y 5.77 B)

(7) Promotion of Standardization

Provisions will be made for active participation and for taking initiative in international standards-setting activities, such as those by the International Standards Organization (ISO). Technical assistance in standardization to developing nations will be increased. The international expansion of standardization programs will be promoted. Standards-setting as a support base for technology development in information technologies (promotion of the OSI), new materials, biotechnology, and other advanced technologies will be pursued.

Budget:

- o Execution of international standardization programs Y 80 M (Y 80 M)
- o Research and investigation related to standardization in advanced technologies (includes EDEPE): Y 250 M (Y 190 M)

(8) Augmentation of the Industrial Property Rights System

The "paperless office" and related projects will be carried out to provide for fast, accurate assignment of property rights and effective utilization of patent information. Revision of the Patent Law will be developed to provide



appropriate protection of the results of technological developments and to ensure the compatibility of the Patent Law with international requirements. Measures will be taken to strengthen the basis for the Special Patent Account.

Budget:

- o Promotion of comprehensive mechanization of patent work (SAPA):  
Y 10.3 B (Y 8.34 B)

2. Information Resource Utilization Measures

- (1) Augmentation of the base for human resource development
- (2) Promotion of software development
- (3) Augmentation of database facilities
- (4) Promotion of standardization and system operational compatibility
- (5) Promotion of information resource utilization in industries
- (6) Promotion of area-specific information resource utilization
- (7) Development of information-related technologies (See Section IV.1.)
- (8) Promotion of information resource utilization in small businesses (See Section III.)
- (9) Keeping Pace with International Information Resource Utilization

Continued cooperation with developing nations will be provided in information resource utilization through research and development of a machine translation system to be used by neighboring nations. This will provide for international expansion of policies related to information resource utilization.

3. Provision of Appropriate Measures to Deal with an Increasingly Service-Oriented Economy

- (1) Development of new businesses
- (2) Development of new "events"

V. Resources/Energy Policies Based on the Long-Term Perspective

1. Petroleum Policies

- (1) Strengthening the viability of the petroleum industry
- (2) Strengthening the systems for the marketing/distribution of volatile oils
- (3) Vigorous execution of petroleum development programs
- (4) Implementation of petroleum/LPG stockpile programs

2. Energy Resource Diversification and Energy Conservation

- (1) Atomic power safety assurance

Budget:

- o Development of human factor-related technologies for operational atomic power stations, as part of the contract funds for the test and demonstration of lightwater reactor improvement technology (EDEPE):  
Y 400 M (0)

(2) Nuclear Fuel Recycling Program

Budget:

- o Grant-in-aid for the feasibility study of the development of a uranium

enrichment system based on atomic laser technology

(EDEPE):

Y 4.35 B (0)

(3) Diversification of Electrical Power Sources

Budget:

o Contract funds for the test and demonstration of new power generation reactor technology

(EDEPE):

Y 4.4 B (0)

o Grant-in-aid for the development of fluidized bed coal gasification power generation plant

(EDEPE):

Y 11.34 B (Y 1.98 B)

(4) Execution of Electrical Power Plant Site Acquisition Policies

(5) Development and Introduction of Petroleum Replacement Energy, and Execution of Programs to Promote Energy Conservation

Financial Investments:

o Promotion and widespread introduction of cogeneration systems

(Japan Development Bank loans):

Y 4 B (0)

3. Execution of Eight Petroleum Policy

4. Assurance of Stable Resources Supply

(1) Stabilization of metal mining industry and metal ore exploration in Japan and abroad

(2) Ensuring stable supply of rare metals

(3) Development of deep sea bottom mining resources

Budget:

o Manganese globule mining system as part of the large-scale industrial technology development:

Y 850 M (Y 960 M)

VI. Realization of comfortable, affluent living for all and balanced development of national land resources

1. Realization of Comfortable, Affluent Living

(1) Expansion of industries related to everyday life

Budget:

o Automated sawing system as part of the large-scale industrial technology development:

Y 1.35 B (Y 1.34 B)

(2) Expansion of Social Capital Resources

Budget:

- o Development of new materials and machinery system technology for the construction of collective residential buildings (includes PRCPE and EDEPE):  
Y 1.07 B (Y 0.95 B)
- o Development of mechanical information systems for social development  
Y 100 M (0)
- (3) Improvement of consumer protection
- (4) Improvement of material distribution systems
- (5) Reduced work hours and increase in leisure
- (6) Preparing for the advent of a "gray" society

There has been a steady aging of the population. On 6 June, the Cabinet adopted broad policies providing guidelines for the measures to be taken by the government on the problems of an aging society. Improvements will be made on the social environment to expand job opportunities for the elderly. The development and dissemination of medical equipment for the care of the elderly and the development of medical diagnosis support systems will be pursued.

Budget:

- o R&D of medical care and human welfare hardware technology:  
Y 700 M (Y 680 M)
- o Development of medical diagnosis support systems: Y 210 M (Y 100 M)
- (7) Industrial Safety Assurance
- (8) Expansion of Environmental Protection Measures
- 2. Balanced Development of National Land Resources
  - (1) Establishment of a new industrial relocation program
  - (2) Expansion of the technopolis program implementation
  - (3) Promotion of the "Research Core" concept

Established throughout the nation will be research cores accumulated through the use of advanced industry support functions such as R&D, venture business financing, and personnel resources development as provided by the Interim Private Sector Revitalization Act. A balanced development of the national land resources will be provided through the promotion of region-specific industrial structures.

- (4) Execution of an industry-promoting project concept
- (5) International expansion of the "Technomart" concept
- (6) Promotion of region-specific information resources (See Section IV)
- (7) Promotion of internationalization of regional economies (See Section I)
- (8) Securing a stable supply of industrial water

Budget:

o Integrated water recycling system as part of the large-scale industrial technology R&D budget (Includes "Aqua-Renaissance 90" project and PRCPE):

Y 2.32 B (Y 1.07 B)

Note 1: The figure represents the 1987 budget and financial investment requests. Unless otherwise stated, the budget figures indicated are those identified in the General Account Budget. The following abbreviations apply to special budget accounts:

IISAO: Industrial investment special account outlay  
 IISAL: Industrial investment special account loan  
 EISA: Export insurance special account  
 AMPSA: Alcohol monopoly program special account  
 CCPE: The coal component of the special account for coal, petroleum, and petroleum-replacement energy  
 PPCPE: The petroleum and petroleum-replacement energy components of the special account for coal, petroleum, and petroleum-replacement energy (Petroleum policy)  
 PRCPE: The petroleum and petroleum-replacement energy components of the special account for coal, petroleum, and petroleum-replacement energy (Alternative energy source policy)  
 ESEPD: The electrical power plant site acquisition component of the special account for electrical power development  
 EDEPD: The electrical power source diversification component of the special account for electrical power development  
 SAPA: Special account for patent administration

Note 2: Unless otherwise stated, the figures within parentheses are 1986 initial budget and financial investment amounts.

Table 1. Summary of 1987 MITI Budget Request

	1986 Budget Authorization*	1987 Budget Request*	Percentage Increase
General Account (Amount transferred from Gen. acct. to coal/petroleum special account)	7,822 (4,550)	7,425 (4,160)	- 5.1 (- 8.6)
Spec. acct. for coal, petroleum, alt. energy	6,079	5,892	- 3.1
Coal/petrol./alt. energy account	4,844	4,648	- 4.0
Petroleum programs	4,269	4,160	- 2.6
Oil replacement energy programs	574	488	-15.1

Coal account	1,235	1,244	0.7
Electrical power source development special acct.	2,708	2,847	5.1
Electrical power plant site acquisition account	1,017	1,076	5.8
Electrical power source diversification account	1,691	1,770	4.7
Patent administration special account	450	593	31.7

\* In Y 100 yen

Table 1. Summary of 1987 MITI Budget Requests for R&D as of September 1986 (in units of 100 M yen)

Items	1986 Budget Authoriz.	1987 Budget Request	Increase/ Decrease	Remarks
Total tech. R&D	1,971	2,086	115	Excl. of industrial investment acct.
General Acct.	705	695	- 10	
Special accts.	1,265	1,391	126	
<hr/> Major Items				
R&D of next generation of industrial base technol. (new materials, biotech, new functional elements)	65 ( 9)	65 (14)	0 ( 6)	
Large-scale projects	152 ( 87)	157 ( 98)	6 ( 12)	Start of full-scale R&D of super- advanced processing systems
"Sunshine" project	430 (406)	486 (464)	56 (58)	
"Moonlight" project	123 (112)	119 (111)	- 4 (- 2)	
Medical care equip. R&D	7	7	0	New starts in auto. leucocyte classif. & bedsore allev. equipment R&D
Fifth Gen. Comp. R&D	45	41	- 4	

Collective residential material & machinery system R&D	9 ( 7)	11 ( 8)	1 ( 1)	
Indust. vitaliz. R&D	14	10	- 4	
International joint aircraft R&D (YXX, V2500)	47	47	0	
Unmanned space exp. system (space experiments, observ. free flyer) development	2 ( 0)	17 (13)	16 (13)	
Resource explor. monitor. sys. R&D (Develop. of satellite to be launched)	1 ( 1)	20 (20)	19 (19)	Y 3 B for ground exper. model incl'd in Large-Scale Proj.
New power generation reactor demonst. proj.	0 ( 0)	44 ( 44)	44 ( 44)	Fast breeder react. implementation (new)
Atom laser-based uranium enrichment R&D	0	43	43	Develop. of hardware for fabrication of laser & other exp. equipment (new)
Government/civilian joint research	2	4	2	
Priority area technology R&D	2	2	0	
Area-specific system technology R&D	5	8	3	
Cooperation to developing nations	8	10	8	
"Human Frontier Science" program	0	0.5	0.5	Separate request made in S&T Promotion Budget
Financial investment/loan to Base Technology Research Promotion Center	205	290	85	Industrial Invest. Account

Note 1: The figures inside parentheses are special account figures which are included in the figures immediately above.

Note 2: Due to rounding, totals may not agree.

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CSO: 4306/3126

## TELECOMMUNICATION

### NTT TO START LARGE-SCALE TEST IN FOUR CITIES

OW070819 Tokyo KYODO in English 0808 GMT 7 Dec 86

[Text] Tokyo, 7 Dec (KYODO)--Nippon Telegraph and Telephone Corp (NTT) is to start large-scale experimental use of its information network system (INS) --a digitalized high-speed telecommunications network service--from late December.

The test, in Tokyo, Osaka, Nagoya and Tsukuba, is intended to prepare for the planned start in March 1988 in major cities throughout Japan of the commercial INS service using international technical standards, according to the telecommunications giant.

INS is the NTT version of the integrated service digital network (ISDN) and transforms human voice messages, sounds, pictures, or various data into digital signals which are transmitted through optical fiber cables.

The systems can simultaneously send messages through a number of telecommunications terminals such as telephones, facsimile machines or personal computers.

The large-scale test of 1,300 circuits will use some 200 digital telephones, television conference systems, digital facsimile machines and other digital telecommunications equipment. Some 200 business firms will join the experiment, NTT said.

The experiment will use NTT's own technical standards called "ym interface" which is capable of transmitting 88 kilobits of information per second, compared with the 144 kilobits per second recommended in international technical standards.

The international standards, called "i interface," are recommended by the International Telegraph and Telephone Consultative Committee (CCITT) of the International Telecommunication Union (ITU), a Geneva-based regulatory body.

NTT plans to use the international standards for its commercial INS service, a decision which was made in mid-June in response to recommendations by a private advisory panel headed by Eishiro Saito, chairman of the Federation of Economic Organizations (Keidanren).



The proposals, presented to then Posts and Telecommunications Minister Bunsei Sato, called for dropping the NTT standards to achieve compatibility of telecom equipment.

NTT has to date tested its INS system and technical standards at a speed of 88 kilobits per second in the cities of Mitaka and Musashino, both in the suburbs of Tokyo.

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CSO: 4307/6001

## TRANSPORTATION

### BRIEFS

ENGINE TECHNOLOGY TO ROK--Tokyo, 27 Nov (KYODO)-- Fuji Heavy Industries, Ltd, a major maker of small automobiles, said Thursday it has agreed to provide engine technology to the Hung Machinery Ind. Co, South Korea's top gasoline engine maker. The accord calls for Fuji to license the South Korean maker to produce three types of gasoline and diesel engines using Fuji's technology, Kazunori Yamafuji, the firm's spokesman, said. The South Korean maker plans to produce an initial 6,000-10,000 units in 1987 for use in agricultural equipment and electric generators, he said. The two firms first went into partnership in December 1973 when they concluded an agreement calling for Fuji to provide production technology for three general-purpose gasoline engines, he added. [Text] [Tokyo KYODO in English 0801 GMT 27 Nov 86 OW] /9738

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